Take home exam

PhD in Business Economics   Course: Econometrics III - Time Series

Professor: Hedibert Freitas Lopes

Start: 6am, February 19th, 2019.   End: 6pm, February 21th, 2019.

Problem 1:   The data below is the index (average 2012=100) of the monthly Brazilian production meat products from January 2002 to December 2018 ($n = 204$ observations). The data was collected from IBGE's SIDRA system (`https://sidra.ibge.gov.br/tabela/3650`). Fit your *best* time series model to the data up to (and including) December 2017 with the goal of producing point and interval forecasts for the months of January 2018 to December 2018. In other words, your goal is to selected the model that best fit out of the sample. Possible models include AR, MA, ARMA, ARIMA models and seasonal extensions of these models. Report your model search strategy and findings in details along with your `R` code.

```
# Tabela 3650 - Producao Fisica Industrial, por grupos e classes industriais
# selecionados.
# Variavel - Indice de base fixa sem ajuste sazonal (Base: media de 2012 = 100)
# 10.1 Abate e fabricacao de produtos de carne

y = c(91.4,83.2,84.6,90.7,92.6,90,98,95.9,92.6,98.5,91.3,88.9,94,88.5,90.7,88.3,
94.2,86.8,91.7,87,91.6,97.6,87.9,87.3,90.6,88,100.4,94,100.6,102.8,103.6,103.3,
101.9,101.3,97.9,100.3,99.6,92.4,103.5,100.6,103.4,107.4,103.5,108.6,102.6,97,
100,102.8,103.1,92.6,108.3,86.4,101.8,99.8,103,106.6,99.9,105.8,100.8,101.8,
109.5,100.4,115.2,104.5,111.7,102.3,106.3,109,99.6,109.3,104.2,99.1,111.1,100.6,
103,108.7,110.4,107.5,114.3,108.1,109.6,112.7,99.1,101.5,101.9,95.2,106,99.3,
106.9,107.7,113.1,108.3,106.9,108.7,102.3,104.8,99.6,93.5,114.1,104.6,110.1,
106.9,114.6,109.4,106.6,105.3,102.3,104.1,103.1,101.3,112.3,99.2,108,101.2,
106.1,110.9,103.7,98.4,100,101.7,95.8,92.3,101.4,92.5,106.7,98.1,104.8,109.1,
96.1,106.4,103.1,93.8,104.1,94,97.5,107,105,98.7,107.6,108,102.1,108,100.1,
97.8,104.1,95.7,95.9,98.5,105.9,97.3,111.1,98.6,101.8,105.9,96.2,97.5,97,
90.5,101,97.6,99.3,100.1,104.2,100.3,101,104.2,99.8,99.8,97.9,96.6,100.8,99.3,
102.5,103.4,100.3,104.6,97.3,96.8,95.9,100.3,99.9,95.8,105.7,87.6,105.3,100.7,
105.1,110.5,98.4,102.4,99.8,98.4,104.9,94.4,104.5,112.2,80.9,101.3,98.4,100.7,
98.7,101.0,98.5,92.2)
```

Problem 2:   Download data on VALE, from `yahoo.finance` for instance, starting around 2007 and finishing as close to today as possible. Your task is to fit the GARCH(1,1) model and its various versions presented in class as well as the standard stochastic volatility model to its log returns. If t_n is the last day of your analysis, produce variance forecasts for the following 10 days, i.e. $t_{n+1}, \ldots, t_{n+10}$.